

XXI. *On the Structure of the Ascidia and Stomata of Dischidia Rafflesiana, Wall.* By the late WILLIAM GRIFFITH, Esq., F.L.S. &c. Communicated by R. H. SOLLY, Esq., F.R.S., F.L.S. &c.

Read January 20th, 1846.

THIS curious plant occurs abundantly about Mergui, and affects old and partially decayed trees. I have hence been able to examine abundance of specimens loaded with *Ascidia* of different degrees of development. I offer the observations relating to these curious appendages, as I conceive they throw light on their nature, which, if analogy holds good, appears to have been generally misunderstood. The commonly adopted opinion, and that which Dr. Lindley advocates in his ‘*Outlines of the First Principles of Botany*’ and in his ‘*Introduction to the Natural Orders*,’ is, that the pitcher is a modification of the petiole and the lid or operculum of the lamina. The structure of *Dionæa* certainly seems in favour of this opinion. Mr. Brown, in his “*Remarks on the Structure and Affinities of Cephalotus*,” Lond. and Edin. Phil. Mag. for Oct. 1832, says, that *Ascidia* in all cases are manifestly formed from the leaves, but does not refer the pitcher or lamina to any particular part of the leaf.

The *Ascidia* of this species have, as might be expected, the same arrangement as the leaves: they are opposite and shortly pedicellate. They are however crowded together, while the leaves are distant. In shape they are oblong-ovate, somewhat compressed, with a few elevations and depressions, which correspond to those formed in the leaves by the nervures. They are open at the base, the margins being rounded off owing to their being inflected into the pitcher in the shape of a linguiform process. Immediately below the base they are slightly constricted. The opening is invariably directed upwards. Their colour externally is that of the leaves,—a dingy yellowish green, often

inclining to glaucous. Internally they are of a rich dark purple, studded with innumerable and very minute white spots.

The colour of the inflected portion internally is much lighter than that of the corresponding surface of the leaf: its outer surface is of a light purplish brown (TAB. XVII. fig. 1). They appear at no period to contain fluids, but invariably contain one or more branched roots, which, taking their origin from various parts of the petiole, pass down through the opening. These roots are always more succulent and of a lighter colour than those formed in any other part. Their structure is precisely that of the limb of the leaves; the only difference being in form and in the colour of the inner surface, which corresponds to the concave of the leaves*. This structure presents nothing peculiar, with the exception of the *Stomata*, to which I shall hereafter recur. The proofs I have to give of their being modified laminæ are:—

1. Their similarity in texture and internal structure, and that of the stomata with those of the limb of the leaves.

2. There is a constant and appreciable though slight tendency in the limb of the leaves to assume an involute form, their margins and apex being always, and especially in old leaves, more or less incurved.

3. The occurrence of an imperfectly transformed pitcher (TAB. XVII. fig. 2), in which the body of the pitcher is clearly referable to the limb of the leaf. The petiole has retained its usual form. This specimen resembled closely the bottom of a perfect pitcher, being however much less compressed: it was completely open at the top, no constriction having taken place. The margins and apex were slightly incurved: there was a slight tendency towards coloration, but only towards the fundus.

4. In this family at least, it is more natural to refer the *Ascidia* to the limb, from the general construction of their petioles.

If we can extend the analogy drawn from the structure of the *Ascidia* of this plant to the other cases of their formation, in *Nepenthes*, *Cephalotus* and *Sarracenia*, in which the development is much more perfect, we shall have a

* The leaves are smooth and somewhat concave on one surface, convex and rugose on the other; but the whole growth is so straggling, that it is difficult to say which is the upper and which the under surface. I think the inner surface of the pitcher corresponds to the upper of the leaves, that being the smooth concave surface.

petiole of ordinary form and a curiously modified limb, the lamina being an appendage of the limb. I consider the inflected portion of the pitchers of *Dischidia* as analogous to the moveable opercula of the more perfect examples cited above, although in this it is continuous with the body of the pitcher. Mr. Brown however says (*loc. cit.*), that the Ascidia of *Dischidia* have no laminæ. I may add, that petioles are much less liable to modifications than the laminæ. If the pitchers of *Nepenthes*, &c. are modified petioles, the cucullate bractæ of *Marcgraviaceæ* will be referable to the petiole of the bractæ.

With respect to the Stomata, they exist on both surfaces of the leaves and of the ascidia; most abundantly on the concave surface of the leaf and the corresponding inner surface of the pitcher: most of those developed on the under surface of the leaf and outer surface of the pitcher are imperfect, the degree of imperfection varying much. They are in particular remarkable for the existence of an external cellular *bourrelet*, considerably elevated above the surface and of a whitish colour (TAB. XVII. figs. 3 & 5). It is to their presence that the minute white dots existing on both surfaces of the leaves and ascidia, and so particularly visible on the inner coloured surface of the latter, are to be attributed. They appear to have a very slight connection with the cuticle, being easily detached; they are confined to their respective Stomata, and have no communication of structure between one another; and they appear to be deciduous, since they are not met with in old ascidia. Each *bourrelet* is composed of from 3 to 5 cells: their margins are somewhat inflected. Their appearance is that of a cup-shaped gland. Are these originally parts of a cellular epiderm, the remains of which are visible on many parts of the plant? They cannot be referred to the peculiar epiderm, the discovery of which is due to M. A. Brongniart, from their compound structure.

The Stomata themselves are somewhat elevated above the cutis; the surrounding cells are parallelogrammic and disposed in circles, into the composition of which 3 or 4 cellules enter; and each circle diminishes successively in size from without inwards (TAB. XVII. figs. 4 & 6). The Stoma occupies the space of the innermost circle, and in itself presents nothing unusual. In many of those developed on the inner surface of the pitcher, the whole Stoma is opaque and has a grumous appearance. The cells surrounding those from the inner side of the pitcher are colourless, while in those of the outer surface

of the pitcher and both surfaces of the leaves they are greenish, from a deposit of minute green corpuscles (TAB. XVII. figs. 4 & 6). The space between the Stoma and the inner margin of the innermost circle is invariably uncoloured; any imperfection, when it does exist, is confined to the Stoma, the surrounding circular tissue being in such instances perfect. The fact of the existence of Stomata in the inside of these *Ascidia*, where there can be but a comparatively small ingress of light and air, is curious enough, particularly when coupled with the deep coloration of the tissue on which they are developed; and one is naturally led to ask, Can they have the same functions with those of ordinary foliaceous structure? May not the functions of those in which the Stoma is opaque be glandular?

November 7, 1834.

EXPLANATION OF TAB. XVII.

Fig. 1. A portion of the stem of *Dischidia Rafflesiana*, Wall., bearing a pair of leaves and a pitcher; the latter longitudinally divided:—of the natural size.

Fig. 2. A pair of young pitchers; one well-developed, the other partly abortive.

Fig. 3. Stoma, from the upper surface of the leaf, which corresponds to the inner surface of the pitcher.

Fig. 4. The same, with the *bourrelet* removed.

Fig. 5. Abortive stoma from the surface of the leaf corresponding to the outside of the pitcher.

Fig. 6. The same, with the *bourrelet* removed.

All the figures of the Stomata are viewed as transparent objects, and with triplets of $\frac{1}{18}$ and $\frac{1}{35}$ of an inch focus.